198/2010

Maximum : 100 marks

Time : 1 hour and 15 minutes

1. What is the final value of z after the following code fragment executes?
   int x = 5;
   int y = 2;
   double z = 4;
   z = x/y;
   (A) 2.0 (B) 2.5
   (C) 4.0 (D) 5.0

2. Passing an argument to a function by value means:
   (A) The function does not know the argument's type
   (B) The function receives a copy of the argument
   (C) The function can alter the argument in the calling statement
   (D) That the keyword const is required along with the parameter

3. The parameter passing mechanism of pass-by-reference should be used in a function if:
   (A) the function is to change the value of an argument back in the calling function
   (B) more than one value from the function is to be returned
   (C) data from a large data type (big collection of values) is to be passed to the function
   (D) all of the above hold

4. In a class defined using an object oriented programming language:
   (A) All data elements and functions should be public to maximize flexibility and ease
   of use
   (B) Nearly all data elements should be private and most functions should be public
   (C) Nearly all data elements should be public and most functions should be private
   (D) All data must be private, but functions are neither public nor private.

5. The primary purpose of a class constructor is to:
   (A) Build the class by identifying all of the required components
   (B) Initialize the values of data elements in objects of the class
   (C) Allocate enough memory for an object of the class
   (D) Ensure that there is an appropriate number of objects in the class

6. The standard library function isgraph(c) returns true if c is:
   (A) Any printable character (including space)
   (B) A control character
   (C) Any printable character (excluding space)
   (D) A graphic character (point, line or space)

B 3

[P.T.O.]
7. The keyword "typedef" in the C programming language is used to:
   (A) define a new data type from an existing one
   (B) create a constant value
   (C) declare a new variable of an unspecified type
   (D) declare a new name for an existing variable

8. A grammar in which every production is of the form $X \rightarrow a$ or $X \rightarrow aY$ is a ———— grammar.
   (A) LL(0)  (B) LL(1)
   (C) Context-free  (D) Regular

9. Which of the following data structure is mainly used during shift-reduce parsing?
   (A) Pointers  (B) Arrays
   (C) Stacks  (D) Queues

10. The automaton that can recognize context-free languages is:
    (A) finite state automata only
     (B) push down automata only
     (C) turing machine only
     (D) both push down automata and turing machine.

11. A language $L$ allows declaration of dynamic arrays whose sizes are not known during compilation. It is required to use efficient use of the memory. Which of the following is true?
    (A) A compiler using static memory allocation technique be written for $L$
     (B) A compiler cannot be written for $L$, an interpreter must be used
     (C) A compiler using dynamic memory allocation technique can be written for $L$
     (D) None of the above.

12. If a grammar is $L$ALR(1), then it is necessarily:
    (A) $LR(1)$  (B) $SLR(1)$
     (C) $LL(1)$  (D) $LL(0)$

13. An annotated parse tree is:
    (A) A parse tree with values of only some attributes shown at parse tree nodes
     (B) A parse tree with attribute values shown at parse tree nodes
     (C) A parse tree without attribute values shown at parse tree nodes
     (D) A parse tree with grammar symbols shown at parse tree nodes
14. Let \( F \) be an arbitrary Boolean function of \( n \) variables. Consider the following statements about \( F \):
   I. The function \( F \) can be realized using the Boolean operator \( \land \) and \( \lnot \).
   II. The function \( F \) can be realized using the Boolean operators \( \lor \) and \( \lnot \).
   III. The function \( F \) can be realized using the Boolean operators \( \land \) and \( \lor \).
   Which of the above statements/combinations of statements are TRUE?
   (A) Only I
   (B) Only I and II
   (C) Only III
   (D) All of them

15. Given the function
   \[
   \text{mystery}(\text{int} \ x, \text{int} \ y) \{ \text{return} \ (x > y) \ ? \ 0 : x - y \} ;
   \]
   and \( a \) and \( b \) being two positive integers, what does the call \( \text{mystery}(a, \text{mystery}(a, b)) \) achieve?
   (A) maximum of \( a, b \)
   (B) positive difference of \( a \) and \( b \)
   (C) sum of \( a \) and \( b \)
   (D) none of these

16. Consider the following grammar rules in which \( E \) and \( O \) are non-terminals and \( +, -, *, / \) and \( \text{id} \) are terminals.
   I. \( E \to \text{EOE} \)
   II. \( E \to \varepsilon \)
   III. \( O \to + | - | * | / \)
   IV. \( E \to (E) | \text{id} \)
   Which of the above grammar rules make this grammar a non-operator grammar?
   (A) I only
   (B) II only
   (C) I and II only
   (D) III and IV only

17. Given a binary tree, the tree traversals possible on it are inorder, preorder and postorder. Which one of the following combination of these traversals can be used to reconstruct the original binary tree uniquely?
   (A) inorder and postorder
   (B) preorder and postorder
   (C) inorder only
   (D) preorder only

18. The prefix equivalent of the infix expression \( A - \frac{B}{(C \times D + E)} \) is:
   (A) \(- A / B * C D + E\)
   (B) \(- A / B * C + D E\)
   (C) \(A - B / C * D + E\)
   (D) \(A - B C D E + */\)

19. A process in 'BLOCKED' state was waiting for some service to be completed. When that service completes, it goes to the:
   (A) RUNNING state
   (B) READY state
   (C) SUSPENDED state
   (D) TERMINATED state

20. In the page trace 3, 2, 1, 0, 3, 2, 4, 3, 2, 1, 0, 4 the number of page faults that would occur if the number of page frames used is 3, by the FIFO algorithm is:
   (A) 8
   (B) 9
   (C) 10
   (D) 12

B 5

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[P.T.O.]
21. The lowercase alphabetic characters in the ASCII character set can be converted to their corresponding uppercase characters by adding 32. The same effect can be obtained by one of the following mask operations. Which one?

(A) 0100000 and NOR  
(B) 0100000 and NAND  
(C) 0100000 and OR  
(D) 1011111 and AND

22. The strings that belong to the language generated by the grammar S → 0S1, S → 01 can be:

(A) Generated by a DFA only  
(B) Generated by a PDA only  
(C) Generated either by a DFA or by a PDA  
(D) None of these

23. The number of all possible substrings that can be generated from a string of length n is:

(A) n  
(B) n^2  
(C) n \times (n - 1) / 2  
(D) n \times (n + 1) / 2

24. In a logical address space of 8 pages of 1024 words mapped into 32 frames, how many bits are there in the physical address?

(A) 9  
(B) 11  
(C) 13  
(D) 15

25. Which of the following ordered pair of characters from the set \{a, b\} is the correct choice for the characters # and * respectively in the string abab # * aa if it is to be accepted by a finite automaton whose equivalent regular expression is a(ba + ab)* a:

(A) a, a  
(B) a, b  
(C) b, a  
(D) b, b

26. The alphabet for a language consists of 3 distinct symbols. The maximum number of strings of length n that can be formed is:

(A) n!  
(B) n^3  
(C) n^n  
(D) 3^n

27. The CFG S → ab | abS generates a language that is equivalent to the one generated by the regular expression:

(A) ab*  
(B) (ab)*  
(C) ab*.ab  
(D) (ab)* .ab

28. If A, B, C are Boolean variables, and if “∧” and “∨” denote Boolean “and” and “or,” respectively, which of the following is (are) true?

I. A ∧ (B ∨ C) = (A ∧ B) ∨ (A ∧ C)  
II. (B ∧ A) ∨ C = C ∨ (A ∧ B)

(A) I only  
(B) II only  
(C) I and II  
(D) None of the above
29. If A is an array with n elements and procedure Swap exchanges its arguments, then the following code segment sorts A in descending order.

for (int j = 0; j < n - 1; j++)
    for (int k = 0; k < n - j - 1; k++)
        if (A[k] < A[k + 1])
            Swap (A[k], A[k + 1]);

How many calls to Swap are made if initially, A[i] = i, for i = 0, 1, 2, ......., n - 1?

(A) n - 1    (B) n
(C) n(n-1)/2  (D) (n-1)(n-2)

30. In an LALR parser, merging states with a common core may produce conflicts, but not conflicts.

(A) shift-reduce, reduce-reduce  (B) reduce-reduce, shift-reduce
(C) shift-reduce, shift-stop    (D) shift-stop, reduce-stop

31. Which phase of compilation do you expect the first error to be produced in the following program?

#include <stdio.h>
int main () {
    int I; char j;
    printf("%d", i+=j);
}

(A) lexical analysis   (B) syntax analysis
(C) semantic analysis  (D) code generation

32. The two dimensional matrix transformation for reflection of a point with respect to x-axis is:

\[\begin{array}{ccc}
-1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1 \\
\end{array}\]

(A) \[\begin{array}{ccc}
0 & 1 & 0 \\
0 & 0 & 1 \\
-1 & 0 & 0 \\
0 & 0 & 1 \\
\end{array}\]

33. To create an input stream to read from file input.txt, a programmer could use:

(A) ifstream ist("input.txt");
(C) ifstream ist.file("input.txt");

34. The external cache configuration for a computer is a 4-way set-associative mapped cache with a total of 1 MB main memory, word size of 1 byte, block size of 128 words and a cache size of 8 Kb. The number of bits in the tag, set and word fields are:

(A) 8, 6, 6
(C) 9, 4, 7

How many conflicts, but not conflicts.

(A) shift-reduce, reduce-reduce  (B) reduce-reduce, shift-reduce
(C) shift-reduce, shift-stop    (D) shift-stop, reduce-stop

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35. One of the following encryption algorithms converted the texts as given
   Plain: meet me after the toga party
   Cipher: PHHW PH DIWHU WKH WRJD SDUWB
   Which is the most likely one?
   (A) caesar cipher
   (B) pigpen cipher
   (C) rail fence cipher
   (D) vigenere cipher

36. Given the two languages \( L_1 = (a + b)^*a \) and \( L_2 = b(a + b)^* \), the language that is the intersection of \( L_1 \) and \( L_2 \) is:
   (A) \((a + b)^*ab\)
   (B) \(ab(a + b)^*\)
   (C) \(b(a + b)^*a\)
   (D) \(a(a + b)^*b\)

37. The contents of accumulator after the execution of following set of instructions is
   XRA A
   MVI B, F0H
   SUB B
   (A) 01H
   (B) 0FH
   (C) F0H
   (D) 10H

38. A memory system of 32 kilobytes is required to be built using memory chips that have
   12 address lines and 4 data lines each. The number of such chips that will be required to
   implement the full memory is:
   (A) 2
   (B) 4
   (C) 8
   (D) 16

39. A complete binary tree with 12 leaf nodes:
   (A) cannot have more than 23 nodes
   (B) has exactly 23 nodes
   (C) cannot have more than 21 nodes
   (D) has exactly 21 nodes

40. Which of the following regular expressions generate(s) no string with two consecutive 1’s?
   I. \((1 + \varepsilon)(01 + 0)^*\)
   II. \((01 + 10)^*\)
   III. \((0 + 1)^* (0 + \varepsilon)\)
   (A) I only
   (B) II only
   (C) III only
   (D) I and II only

41. An LR parser traces out:
   (A) a right most derivation for a string
   (B) a left most derivation for a string
   (C) a right most derivation in reverse for a string
   (D) a left most derivation in reverse for a string
42. Given the following struct definition or a node:

```c
struct node {
    int data;
    node * next;
};
```

the head pointer:
```
node * head;
```

and the following contents in memory:

<table>
<thead>
<tr>
<th>address</th>
<th>data</th>
<th>next</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>7</td>
<td>103</td>
</tr>
<tr>
<td>102</td>
<td>9</td>
<td>105</td>
</tr>
<tr>
<td>103</td>
<td>4</td>
<td>102</td>
</tr>
<tr>
<td>104</td>
<td>6</td>
<td>105</td>
</tr>
<tr>
<td>105</td>
<td>3</td>
<td>NULL</td>
</tr>
</tbody>
</table>

The longest list is obtained if the starting location of the lists is pointed by the address:

(A) 101  (B) 102  (C) 103  (D) 104

43. Let A be a finite set of n elements. The number of elements in $2^A \times 2^A$ is:

(A) $n^2$  (B) $2$ raised to $2^n$  
(C) $2^{2n}$  (D) $2^{n^2}$

44. `yylex` in LEX generated scanners represent:

(A) the string representing the recognized token  
(B) the function representing the lexical analyser  
(C) the type of the current token recognized by the lexical analyser  
(D) the error code returned by the lexical analyser.

45. Unit testing is defined to be:

(A) running the system with line data by the actual user  
(B) checking that the logic of the system only on a representative basis with candidate functions  
(C) ensuring that the functions process certain transactions according to specification  
(D) testing if individual units of code are fit for use.

46. Pass-by-reference parameter passing mechanism should be used in a function if:

(A) You want the function to be able to change the value of an argument back in the calling function  
(B) You want to return more than one value from the function  
(C) You want to efficiently pass a large data type (like a large vector) to the function  
(D) In all of the above circumstances
47. Consider the following int – array: int a[10] = {7, 3, 2, 4, 6, 9, 12, 1, 1, 3};
After processing it with selection sort for increasing order with <, what would be the contents of a at the end of the second pass?
(A) 7 3 2 4 6 9 3 1 1 1 2 (B) 1 3 2 4 6 1 3 7 9 1 2
(C) 7 3 2 4 6 1 3 1 9 1 2 (D) 1 3 2 4 3 1 6 7 9 1 2

48. In 3-D graphics, the transformation matrix given below is representing
1 0 0 0
0 0 1 0
0 -1 0 0
0 0 0 1
(A) translation (B) rotation by 90 degrees about X-axis
(C) rotation by 90 degrees about Y-axis (D) rotation by 90 degrees about Z-axis

49. The operation on which recursively enumerable languages are not closed under is:
(A) union (B) intersection
(C) complementation (D) concatenation

50. The number of times that the NOP operation executed in the following program is:
MVI A, 10H
MVI B, 10H
BACK : NOP
ADD B
RLC.
JNC BACK
HLT
(A) 1 (B) 2
(C) 3 (D) 4

51. At present the contents of SP and PC on the 8085 microprocessor are F000H and 2400H respectively. The contents after CALL E000 will be:
(A) PC : F003 SP : 2400 (B) PC : E000M SP : 2400
(C) PC : E000, SP : EFFE (D) PC : E000, SP : 23 FE

52. The contents of accumulator after the execution of following set of instructions is:
XRA A
MVI B, F0H
SUB B
(A) 01H (B) 0FH
(C) F0H (D) 10H

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53. For a relation schema R(A, B, C, D, E, F) with the dependencies C → F, E → A, EC → D, A → B. A key for R can be:

(A) CD
(B) EC
(C) AE
(D) AC.

54. A microprocessor which is about execute an instruction first goes through the fetch phase. The sequence of operations that take place during this phase are:

(A) PC → MAR → Memory → MDR → IR
(B) PC → MAR → Memory → IR
(C) PC → Memory → MDR → IR
(D) PC → Memory → IR

55. The minimum number of gates required to implement the Boolean expression XY + XY' + XZ is:

(A) 1 AND and 1 OR gates
(B) 2 NAND gates
(C) 3 AND and 2 OR gates
(D) 1 AND, 1 OR and 1 NOT gate

56. Consider a set X = {a, b, c, d}, and the following relations defined on set X.
R1 = {(a, a), (a, b), (b, a), (b, b)}
R2 = {(c, c), (d, d)}

Now consider the following statements about the above relations.
I. The relation R1 on set the X is a reflexive, symmetric and transitive relation.
II. The relation R2 on set the X is a symmetric relation as well as an antisymmetric relation.

Which of the following hold?

(A) I is true and II is false
(B) I is false and II is true
(C) both I and II are true
(D) both I and II are false

57. A 100 km long cable transfers data at T1 data rate. The propagation delay in the cable is 2/3rd the speed of light. How many bits can be carried by the cable?

(A) 572
(B) 672
(C) 772
(D) 872

58. The binary equivalent of the decimal number 0.34375 is:

(A) 0.0111
(B) 0.01111
(C) 0.01011
(D) 0.01101

59. In the Internet Protocol (IP), the time-to-live (TTL) field in the IP header is used:

(A) to ensure that the packets reach the destination within the time specified
(B) to discard packets that reach the destination later than the time specified
(C) to limit the time for which a packet gets queued in the intermediate routers
(D) to prevent packets from looping indefinitely
60. Given two sorted lists of sizes m and n respectively, the number of comparisons required in the worst case to arrange in sorted order by the merge sort algorithm is:

(A) $m \times n$  
(B) maximum of m and n  
(C) minimum of m and n  
(D) $m + n - 1$

61. Consider a polynomial $f(x) = a_0 + a_1x + a_2x^2$ in $x$, where $a_i \neq 0, \forall i$. The minimum number of multiplication required to evaluate the polynomial on a given input $x$ is:

(A) 2  
(B) 3  
(C) 4  
(D) 5

62. Consider the following recursive function:

```c
int f (int n)
{
    if (n == 4)
        return 2;
    else
        return 2 * f(n + 1);
}
```

What is the value returned by the function call `f(2)`?

(A) 2  
(B) 4  
(C) 8  
(D) 16

63. Thrashing occurs when

(A) too much of the time is spent in waiting to swap between memory and disk  
(B) two processes try to access the same resource  
(C) the size of the data to be inserted is less than the size of a page in memory  
(D) the processor's mapping table discovers that the program is trying to use an address that doesn't currently exist

64. If $L_1$ is a context free language and $L_2$ is a regular language, which of the following is true?

(A) $L_1 \cup L_2$ is not context free  
(B) $L_1 \cap L_2$ is context free  
(C) $\sim L_1$ is context free  
(D) $\sim L_2$ is not regular

65. Given $L_1 = \{a^n b^n a^n \mid n \geq 1\}$, $L_2 = \{x \mid x$ is a palindrome in $(0+1)^*\}$ and $L_3 = \{a (a+b)^*\}$, identify the incorrect statement from the following set:

(A) $L_1$ is context sensitive and $L_2$ is context free  
(B) $L_2$ is context free and $L_3$ is regular  
(C) $L_1$ is context free and $L_2$ is context free  
(D) $L_1$ is context sensitive and $L_3$ is regular
66. A router has the following routing table

<table>
<thead>
<tr>
<th>Network ID</th>
<th>Subnet Mask</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.16.128.0</td>
<td>255.255.224.0</td>
<td>eth 0</td>
</tr>
<tr>
<td>10.16.128.0</td>
<td>255.255.240.0</td>
<td>eth 1</td>
</tr>
<tr>
<td>10.16.128.0</td>
<td>255.255.255.0</td>
<td>eth 2</td>
</tr>
</tbody>
</table>

default eth 3

The interface that will be used to route the packets addressed to destination 10.16.129.17 is

(A) eth 0  
(B) eth 1  
(C) eth 2  
(D) eth 3

67. Consider the turing machine \( M = \{ q_0, q_1, q_2, q_3, q_4, q_5 \} \) \{0,1\}, \{0,1,x,y,b\}, \( \delta, q_0, \{q_5\} \) where \( b \) represents the blank symbol on the tape (infinite on both ends) and \( \delta \) is defined as

\[
\delta(q_0, 0) = (q_1, x, R), \hspace{1cm} \delta(q_0, b) = (q_2, b, R), \hspace{1cm} \delta(q_1, 0) = (q_1, 0, R), \hspace{1cm} \delta(q_1, y) = (q_1, y, R), \\
\delta(q_2, 0) = (q_3, 0, L), \hspace{1cm} \delta(q_2, y) = (q_2, y, L), \hspace{1cm} \delta(q_2, x) = (q_4, x, R), \hspace{1cm} \delta(q_3, 0) = (q_3, 0, L), \\
\delta(q_3, x) = (q_0, x, R), \hspace{1cm} \delta(q_4, b) = (q_5, b, R) \hspace{1cm} \text{and} \hspace{1cm} \delta(q_4, y) = (q_4, y, R).
\]

What does the configuration \( bx01q_11b \) change to on the next move when the initial input string is \( \ldots bbb00111bbbblb \ldots \)?

(A) \( bx0yq_{11b} \)  
(B) \( bx0yq_{1}1b \)  
(C) \( bx0q_{2}1yb \)  
(D) \( bx0q_{3}1yb \)

68. Consider the relation scheme \( R(A, B, C, D) \) and the dependencies \( A \rightarrow B, B \rightarrow C, C \rightarrow D \) and \( D \rightarrow A \). If \( R \) is decomposed into two relations \( R_1 \) and \( R_2 \) such that \( R_1 \cap R_2 = \emptyset \), then the decomposition is:

(A) not in 2 NF  
(B) in 2 NF but not in 3 NF  
(C) in 3 NF but not in 2 NF  
(D) in both 2 NF and 3 NF

69. In the small C++ program fragment that follows

```cpp
class shape {
    int position;
    protected:
        int visible;
    public:
        int colour;
};

class circle : public shape {
    public:
        int radius;
};

class ellipse : circle {
    int minor;
};
```

The variable visible is accessible

(A) to a public function in class shape  
(B) to a public function in class circle  
(C) to a public function in class ellipse  
(D) all of these

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70. The SQL expression

```
SELECT DISTINCT T.deptname from college T, dept S where T.lstaff < S.lstaff and
S.deptname = 'CSE';
```

finds the names of:

(A) all departments that have more lady staff members than any group in
    CSE department.
(B) all departments that have more lady staff members than all groups in
    CSE department.
(C) the department that has the greatest staff strength in the college.
(D) any department that has the greatest number of lady staff members than any group in
    CSE department.

71. Consider the following statements about opening a file from a C program.

I. A file can be opened only once inside a C program.
II. A file can be opened more than once inside a C program giving a separate file descriptor
    in each open statement.
III. The same file can be opened from more than one C program and these programs can be
    executed at the same time giving them concurrent access to the file.
IV. The same file can be opened from more than one C program, but these programs must
    not be executed at the same time.

Which of the above statements are TRUE?

(A) Only I  
(C) Only II and III
(B) Only II       
(D) Only II and IV

72. \( x = at^2; \ y = 2at \) is the parametric equation of the:

(A) rectangular hyperbola  
(C) parabola *
(B) circle       
(D) ellipse

73. A linear queue contains the elements 1, 2, 3, 4 in that order from front to rear. How many
minimum operations are required to be done inorder to reverse that order? (i.e. obtain 4, 3, 2, 1 from front to rear). Assume that a stack is available for auxiliary storage.

(A) 8  
(C) 10
(B) 6       
(D) 9

74. The code segment

```
if (n == 1) {k++;} else if (n == 3) {k+= 3;}
```

needs to be rewritten in the form of a single if statement in the form if (conditional – expression) statement;

What are the possible values of conditional – expression and statement for achieving this?

(A) \( n == 1 \land \land k == 3, k += n; \)  
(C) \( n == 1 \lor k == 3, k += n; \)
(B) \( n == 1 \land \land k == 3, k += 3; \)  
(D) \( n == 1 \lor k == 3, k += 3; \)
75. Which of the following propositional formula is a tautology?

(A) \( p \land \neg q \)  
(B) \( p \Rightarrow (p \lor q) \)

(C) \( p \Rightarrow (p \land q) \)  
(D) \( (p \lor q) \Rightarrow (p \land q) \)

76. \( x \) raised to \( y \) is equivalent to:

(A) \( x \ast \exp (\ln y) \)
(B) \( y \ast \exp (\ln y) \)

(C) \( \exp (y \ast \ln (x)) \)
(D) \( \exp (x \ast \ln (y)) \)

77. The set of all equivalence classes of a finite set \( A \) of cardinality \( n \) has:

(A) the same cardinality \( n \) as that of \( A \)
(B) forms a partition of \( A \)

(C) has the cardinality \( n^2 \)
(D) has the cardinality \( 2^n \)

78. Which one of the following is NOT TRUE about the 8086 microprocessor?

(A) The arithmetic unit of 8086 microprocessor uses separate functional unit for the addition of unsigned and signed integers
(B) The 8086 microprocessor uses 2's complement number system to represent signed integers

(C) The size of the segment registers is 16 – bits
(D) The arithmetic unit of 8086 microprocessor does not have a floating point unit

79. A full binary tree with \( n \) non-leaf nodes contains __________ nodes in total.

(A) \( \log_2 n \)
(B) \( 2n + 1 \)

(C) \( n + 1 \)
(D) \( 2n \)

80. Pick out the non-equivalent form (regular expression / grammar) of the language generated by the grammar \( S \rightarrow aS \mid bS \mid a \mid b \):

(A) \((a + b)^*\)
(B) \((a \ast b \ast)^*\)

(C) \(S \rightarrow Sa \mid Sb \mid a \mid b\)
(D) \((ab)^*\)

81. YACC builds a __________ parsing table in the parsers that it generates or the given input CFGs.

(A) SLR
(B) canonical LR

(C) LALR
(D) LL

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82. A digital circuit consists of 3 cascaded 2-input NAND gates. One of the inputs to each gate is the input signal X and the other one is the output from the previous stage. X is input to both the signals of the first gate. What is the output obtained from the last gate?

(A) 0  
(B) 1  
(C) X  
(D) \( X' \)

83. The shell command

```
find . - name passwd - print
```

is executed in the /etc directory of a computer system running Unix by a user who has the rights to view every file coming under it. Which one of the following shell commands would give the same information as the above command when executed in the same directory?

(A) `ls passwd`
(B) `cat passwd`
(C) `grep name passwd`
(D) `grep print passwd`

84. The industry standard sector size of hard disks is:

(A) 1 K byte
(B) 1/2 K byte
(C) 1/4 K byte
(D) 1/8 K byte

85. Adjacency matrix representation of a graph of n edges requires space of the order of:

(A) \( O(n) \)
(B) \( O(\log n) \)
(C) \( O(n^2) \)
(D) \( O(2^n) \)

86. The maximum size of data that the application layer can pass on to the TCP layer below is of:

(A) any size
(B) 1500 bytes
(C) \( 2^{16} \) bytes – size of TCP header – size of IP header
(D) \( 2^n \) K bytes

87. Which of the following programs in UNIX helps us to configure a machine as a proxy server?

(A) `apache`
(B) `squid`
(C) `synaptic`
(D) `poff`

88. Which of the following 4-bit number equals its 2's complement?

(A) 0101
(B) 1000
(C) 1010
(D) no number exists
89. The language generated by the following context free grammar
\[ S \rightarrow AB \quad A \rightarrow aA \mid bA \mid b \quad B \rightarrow bB \mid aB \mid b \]
has strings that:
(A) have at least one \( b \)  \hspace{1cm} (B) should end in \( \alpha \ b \alpha \)
(C) have no consecutive \( \alpha \)'s or \( b \)'s \hspace{1cm} (D) has at least one \( \alpha \)

90. The number of maximum possible class A networks possible according to the IP V4 TCP/IP protocol addressing scheme is:
(A) 63
(B) 127
(C) 255
(D) 511

91. int i;
   int main ()
   {
       int j = 60; i = 50;
       f(i, j);
   }
   int f(int x, int y){
       i = 100;
       x = 10; y+=i;
   }

What are the values for the variables \( i \) and \( j \) at the end of execution of the main function if the call by reference parameter passing mechanism were to be used in C?
(A)  100, 60
(B)  100, 110
(C)  10, 70
(D)  50, 70

92. The Context Free Grammar with the productions \( S \rightarrow AB \quad A \rightarrow 0A \mid 1 \quad B \rightarrow 1B \mid 0 \) generates the language over \( \{0, 1\} \ast \) which is given by the set?
(A) \( 0 \ast 110 \ast \)
(B) \( 0 \ast 11 \ast 0 \)
(C) \( \{0 \ast 10 \ast n, n \geq 1\} \)
(D) all strings with exactly two 1s.

93. A UNIX file currently has the permission bits 755 stored along with it. What does the command “chmod a+x” do to it?
(A) caused no change in permission bits
(B) changes it to 777
(C) changes it to 555
(D) changes it to 577

B 17

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94. What output will be generated when the following C program is compiled and executed?
```c
#include <stdio.h>
main ()
{
    float f;
    f = 16/3;
    printf("%f", f);
}
```

(A) 5.3
(B) 5.000000
(C) 5
(D) 5.1

95. The maximum addressable physical memory of 8086 microprocessor is:
(A) 1 megabyte
(B) 256 kilobytes
(C) 512 kilobytes
(D) 64 kilobytes

96. What is the binary equivalent of the number 222 in a ternary number system with the digits 0, 1, 2 with 2 > 1 > 0?
(A) 101010
(B) 11000
(C) 10110
(D) 11010

97. In the TCP/IP suite of protocols, which of the following is the exact purpose of the Address Resolution Protocol?
(A) To translate Web addresses to host names
(B) To determine the IP address of a given host name
(C) To determine the hardware address of a given host name
(D) To determine the hardware address of a given IP address

98. The memory address of fifth element of an array can be calculated by the formula, in which \( w \) is the number of words per memory cell for the array:
(A) Base (Array) + \( w \) (5 – lower bound)
(B) Base (Array [4]) + (5 – lower bound)
(C) Base (Array [4]) + (5 – upper bound)
(D) None of the above

99. A constructor:
(A) must have the same name as the class it is declared within
(B) is used to create objects of the class in which it is declared
(C) may be declared private in the class in which it is declared
(D) all of the above

100. A while loop may be rewritten as a for loop:
(A) Always
(B) Only if there is a variable in the while loop which is incremented
(C) Only if there is not a variable in the while loop which is incremented
(D) Only if the number of iterations can be determined in advance.

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"X" denotes deletion